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VOLUMETRIC MRI MAY HELP DISTINGUISH TEMPORAL AND EXTRATEMPORAL EPILEPSIES
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Hippocampal sclerosis, manifest as volume loss on volumetric MRI studies, correlates strongly with post-surgical outcome in temporal lobe epilepsy surgery. Volumetric MRI techniques were applied to normal subjects ($n = 20$) and 2 groups of patients, defined on clinical and EEG grounds; temporal lobe ($n = 36$), and extratemporal ($n = 24$), to establish whether distinction could be made by hippocampal formation (HF) volume measurements. Imaging was performed on a 1.5T GE Signa, and coronal 1.5 mm contiguous slices of the whole brain acquired using a spoiled gradient echo technique. These were processed on a GE IC, and HF surface area in each slice calculated. Volumes were derived using the Cavalieri principle. These were expressed as total volumes, ratios (smaller/larger), and the cross-sectional area plotted against slice number, allowing assessment of regional involvement. HF volume ratio in normal subjects was always >0.96 . Normal HF volumes (volume ratio >0.96) were found in all extratemporal cases, and in all temporal neocortical lesions. Thirty five of the temporal group had volume ratios of <0.95 (range 0.56-0.94). Volumetric MRI studies of the HF may help to distinguish between these important clinical groups.

REMISSION OF SEIZURES IN A COMMUNITY-BASED STUDY OF EARLY EPILEPSY
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The National General Practice Study of Epilepsy (NGPSE) is a prospective community-based study of people developing seizures. 1091 people were registered with the study, of whom 564 were considered to have definite epileptic seizures. They have been followed for up to seven years. The rate of recurrence following a first seizure was 78% in the first three years. Further follow up has shown that early remission is common, with 92% having a period of at least one year free of seizures during the first five years, and 65% having a remission of at least three years. Sixty two per cent of patients with epilepsy (those having two or more seizures) had had a remission of at least one year and remained in remission ("terminal remission") at five years. Those with a congenital neurological disorder showed a trend towards a worse prognosis (42% in one year terminal remission at five years). Seventy seven per cent of people with alcohol-related seizures were in one year terminal remission at this time. Age and seizure-type had little effect.

The study suggests that while most people

developing seizures will have more than one episode, the overall prognosis is good and the epilepsy may be short-lived.

A PLACEBO CONTROLLED DOUBLE BLIND CROSS-OVER TRIAL OF LAMOTRIGINE AS ADD-ON THERAPY ON SEIZURE FREQUENCY, SEVERITY, MOOD AND QUALITY OF LIFE IN PATIENTS WITH TREATMENT RESISTANT EPILEPSY
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The need for new anti-epileptic drugs (AEDs) and more sensitive methods of assessing their efficacy is well recognised. This study was designed to evaluate the efficacy and safety of Lamotrigine, a potential new AED, and to develop and test new outcome measures. A Health-related Quality of Life model was developed which contains previously validated measures of anxiety, depression, happiness, mood, self esteem and mastery and a specifically designed seizure severity scale with patient and carer-based components.

A randomised, placebo controlled study of Lamotrigine in 81 patients with refractory partial seizures was conducted.

The reduction in seizure frequency on Lamotrigine, relative to placebo was 29.7% (95% CIs 17.8%, 39.9%) for total seizure count, 33.4% (95% CIs 14.8%, 47.9%) for complex partial seizures and 20.3% (95% CIs 0.3%, 36.2%) for secondary generalised tonic clonic seizures. The score on Lamotrigine, relative to placebo, was significantly lower for the ictal ($p = 0.018$) and carers ($p = 0.035$) sub-scales of the seizure severity scale and significantly higher for happiness ($p = 0.003$) and mastery ($p = 0.003$).

This study indicates that Lamotrigine is effective in reducing seizure frequency and has additional favourable effects on seizure severity, mood and perceived internal control. Furthermore some of the scales used indicate the potential of secondary measures of efficacy to enhance the sensitivity of trials of new AEDs.

NATIONAL GENERAL PRACTICE STUDY OF EPILEPSY (NGPSE): PARTIAL SEIZURE TYPES IN A GENERAL POPULATION
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The NGPSE is a prospective, community-based study of newly diagnosed epileptic seizures. Of 594 patients with definite epileptic seizures, 160 (26.9%) had seizures with a clinically localisable onset: 36 (22.5%) frontal; 52 (32.5%) central sensorimotor; 43 (27%) temporal; 9 (5.6%) frontotemporal (with features of both frontal and temporal lobe epilepsies), and 10 each (6.3%) parietal and other posterior cortex seizures (without

clear localisation within the posterior cortex). There was no difference between these groups in seizure frequency or remission rate; 46.5% seizure-free and 6.9% with severe epilepsy. Aetiology was identifiable in 41% and focal CT and EEG abnormalities in 33% and 19% respectively, with results discordant with the clinical seizure localisation in 21% and 20% respectively.

Extratemporal epilepsy is extremely common in the general population, especially frontal and central sensorimotor, in relation to cerebrovascular disease. Prognoses are similar for partial epilepsies with different clinical patterns and regions of onset and are much better than suggested in hospital-based studies. The clinical, EEG and CT localisations may be discordant relatively frequently in this non-refractory group.

SENSORY NERVE DYSFUNCTION IN AMYOTROPHIC LATERAL SCLEROSIS: A PROSPECTIVE NEUROPHYSIOLOGICAL STUDY
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Neuronal degeneration in amyotrophic lateral sclerosis (ALS) is popularly regarded as being confined to the upper and lower motor neurons. However, neuropathological evidence points to involvement of a wider range of neurons. A prospective study was carried out to determine whether sensory nerve function progressively declines in parallel with motor deterioration in ALS.

Nerve conduction and vibration thresholds were measured in 12 patients with ALS. Nerves vulnerable to external compression were not studied. The assessment was repeated after intervals of six to 17 months. A control group was also studied, six normals and six with other chronic neurological disabilities. In the ALS group, the amplitude of the sensory nerve action potentials (SNAP) in the median, radial, and sural nerves fell significantly ($p < 0.04$). The median nerve somatosensory evoked potential N19 latency increased significantly ($p < 0.008$). Vibration thresholds increased during the study period, but not by significant levels. No significant changes occurred in the control group.

Sub-clinical deterioration in sensory nerve function occurs during the course of ALS, suggesting the disease is caused by an agent with generalised neurotoxic effects rather than one only affecting motor neurons.

TRIGEMINAL NERVE SECTION FOR CHRONIC UNREMITTING MIGRAINOUS NEURALGIA
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A series of fourteen patients is reported who had partial or complete trigeminal nerve root section for chronic unremitting migrainous neuralgia (mean follow up 5.6 years). They had all suffered attacks with severe pain for

over 18 months without remission (mean duration 5.5 years). Symptoms were refractory to extended medical intervention, and had caused prolonged disruption of lifestyle. The sensory root was completely divided in two cases with complete relief of pain. In the other 12 patients, 50–90% of the superomedial portion of the sensory root was divided. Of these, five received no further surgery, and experienced complete ($n = 2$), near complete ($n = 2$), or incomplete ($n = 1$) relief of neuralgia. The remaining seven patients in the partially divided group were not relieved of pain after operation. They showed incomplete sensory loss in the first trigeminal division (V1), and had a second operation to extend the nerve division. Overall, 12 out of 14 patients (85.7%) receiving surgery for chronic migrainous neuralgia experienced adequate pain relief, and are able to follow a normal life. The remaining two patients are still experiencing severe neuralgia. Corneal abrasion was the commonest complication occurring in four. It is concluded that primary complete trigeminal nerve section is an effective and safe treatment for most patients with chronic migrainous neuralgia.

MULTIPLE SCLEROSIS IN THE CAMBRIDGE HEALTH DISTRICT

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A population-based survey of multiple sclerosis in the Cambridge Health District of East Anglia has given a prevalence of 130 per 100 000. Eighty six per cent had either clinically definite or probable multiple sclerosis, and 14% had suspected multiple sclerosis. The incidence during 1989–91 was 5.94 per 100 000 per year. The mean age was 49.2 years (range 17–83), with a sex ratio of 2.5 females to males.

The prevalence figure is higher than other recent surveys of the southern part of the United Kingdom, but correction for age and sex characteristics of the study population eliminates these differences. Combination of the Cambridge results with the results of other recent surveys of the southern United Kingdom permits calculation of an overall prevalence figure of between 108 and 120 per 100 000. Recent prevalence figures obtained by comparable surveys in Scotland remain consistently higher than this, supporting the idea that there is a north-south gradient in the distribution of multiple sclerosis.

MICROGLIA—OLIGODENDROCYTE INTERACTIONS IN VITRO: A ROLE FOR COMPLEMENT AND TUMOUR NECROSIS FACTOR

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Two pathological features seen in multiple sclerosis are a reduction in the number of oligodendrocytes and macrophage/microglia stripping of the myelin sheath. There are several ways in which microglial interaction with oligodendrocytes could take place; the roles of complement ligand-receptor interactions and tumour necrosis factor (TNF) were examined. Neonatal rat oligodendrocytes were cultured in vitro before the addition of resting and activated microglia obtained from the same animals. Analysis of interactions was carried out by scanning

electron microscopy, immunofluorescence staining for myelin basic protein within microglia. TNF levels were assessed in a bioassay using L929 cells.

Resting microglia "patrol" oligodendrocyte cultures and although at any one time there is minimal cell-cell contact double immunofluorescence staining for myelin basic protein and a macrophage-microglial specific marker ED1 showed up to 25% of microglia contained myelin remnants, suggesting one function of microglia is to phagocytose myelin debris. When the microglia were activated with gamma-interferon, or lipopolysaccharide and interferon, the proportion of cells containing myelin basic protein rose slightly. In the presence of a source of complement (normal rat serum or C8/9 depleted serum, 1 on 40 concentration) the number of microglia containing myelin basic protein approximately doubled under each of the activating conditions compared to the complement free cultures. Scanning electron microscopy of cultures exposed to complement and containing activated microglia showed reduced oligodendrocyte numbers especially in the lipopolysaccharide-interferon activated group which was proportional to the amount of TNF produced by the microglia. There was extensive contact between surviving oligodendrocytes and microglia in these cultures.

These results suggest that activated microglia are capable of inflicting oligodendrocyte damage in vitro binding through complement receptors and killing target cells by the production of TNF.

THOUGHT DISORDER IN MULTIPLE SCLEROSIS

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Six physically disabled male patients with multiple sclerosis developed a strikingly similar pattern of mental change. Neuropsychological and psychiatric investigations were carried out to characterise the nature of the mental disorder.

A disorder of communication occurred in all patients. Aphasia was absent. Conversational speech was extremely slow and circumstantial, content alternating between philosophical abstraction and concrete minutiae. Thought processes exhibited poverty of content, derailment and loss of goal awareness, and on a test of formal thought disorder (TLC of Andreasen) two patients displayed a similar profile to that found in schizophrenia. Neuropsychological testing revealed difficulty on frontal lobe tasks, which require organisation, planning and use of strategy. Performance on memory tests suggested poor organisation rather than amnesia per se. All patients were compliant and had partial insight into mental difficulties.

The abnormal mental states fluctuated in intensity and were associated with other psychiatric symptoms, namely Capgras syndrome, delusional mood, ideas of reference, inappropriate affect and catatonia. Phenothiazine medication improved symptomatology. MRI indicated prominent involvement of the subcortical white matter of the temporal lobe. The affinities of this neuropsychological syndrome with schizophrenic thought disorder suggest the possibility of an organic model for that disorder.

Videorecording illustrated thought disorder.

TOWARDS THE MECHANISM OF BLOOD-BRAIN BARRIER BREAKDOWN IN INFLAMMATORY DEMYELINATION

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In multiple sclerosis (MS), blood-brain barrier (BBB) breakdown is an early and important feature in the evolution of the demyelinating plaque. The mechanism of barrier breakdown is unclear. We have sought to determine whether such breakdown is metabolically-dependent in chronic relapsing experimental allergic encephalomyelitis (CREAE), a model of immune-mediated demyelination showing similarities to MS, using Gadolinium (Gd)-enhanced MRI *in vivo* and the barrier markers, Lanthanum (La) and Gd, histologically.

CREAE was induced in strain 13 guinea-pigs. Eight animals showing well defined regions of Gd-enhancement in the spinal cord (indicating BBB breakdown *in vivo*) were studied. The spinal cords were perfused, in four animals with the metabolic inhibitor 2, 4-dinitrophenol followed by Lanthanide (La or Gd nitrate) with fixative and in the remaining four, Lanthanide and fixative alone. Sections were embedded in Epon and studied by electron microscopy.

In regions of the spinal cord showing Gd-enhancement, without metabolic inhibition an increased number of endothelial vesicles containing Lanthanide was seen and deposition of tracer in the perivascular space. Prior perfusion with 2, 4-dinitrophenol suppressed the appearance of endothelial vesicles containing Lanthanide and tracer in the perivascular space. It is concluded that an important contribution to BBB breakdown in CREAE is dependent on a metabolic change in the endothelial cells.

ACUTE ENCEPHALOPATHY. ULTIMATE DIAGNOSIS AND OUTCOME IN PATIENTS ADMITTED TO A REGIONAL NEUROLOGICAL UNIT

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Sixty five patients with an acute encephalopathic illness were admitted to a regional neurological unit over a seventeen year period, no diagnosis having been reached during initial assessment generally by non-neurologists. Subsequent investigation yielded a definite or probable diagnosis in 34 of these patients, including herpes simplex encephalitis (9 cases), encephalitis due to other identified viruses (7 cases), cerebrovascular disease (7 cases) and multiple sclerosis (4 cases). In these 34 patients, mortality relating to the disease responsible for the encephalopathy was 44% and a further 26% had significant long-term neurological morbidity.

In the other 31 patients, no cause for the encephalopathy was identified despite extensive investigation. These patients had a protracted alteration of conscious level plus recurrent seizures (45%), focal neurological signs (48%), pyrexia (65%), abnormal electroencephalogram (85%) and c.s.f. pleocytosis (82%). During follow-up (1–15 years) none had recurrent encephalopathy and 71% made an eventual complete recovery though delayed by seizures in 13% of cases and psychiatric illness in 26%. The mortality in this group relating to the acute illness was 6%. Thus, in this series, nearly half the

patients referred to neurologists with acute encephalopathy had a relatively benign ultimate prognosis, following a monophasic illness of undetermined cause.

EMOTIONAL LABILITY AFTER STROKE

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Emotional lability is one of the commonest psychological sequelae of stroke. What are its causes and how might it be treated?

Crying after stroke is often sudden in onset, unheralded and outside normal social control, it may therefore be experienced as inexplicable and embarrassing by the sufferer. Occasional patients also describe increased laughing. The phenomenon is commoner in people with large lesions in the brain and with intellectual deficit. In these respects it is like the severe emotional lability seen occasionally in people with pseudobulbar palsy. On the other hand, sufferers have more depressive symptoms than patients without emotionalism. Careful questioning reveals that the crying is usually provoked by an emotionally appropriate stimulus. In these respects it is like the weepiness of grief, distress or depressive disorder.

There are no good treatment trials, but several small studies have suggested that the condition responds to tricyclic antidepressants. Individual cases can respond dramatically. Even here the evidence is not clear cut. Some suggest that tricyclics work only in full dosage and in the presence of a depressive disorder. Others report response with low dosages given for only a few days; in other words a picture unlike the usual in treating depressive states with drugs.

Not all cases improve rapidly or spontaneously, and more detailed study of emotionalism after stroke is worthwhile if it leads to a better understanding of the problem and suggests new treatments.

THE NEUROLOGICAL MANIFESTATIONS OF PROTEIN C, PROTEIN S AND ANTI-THROMBIN III DEFICIENCY

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Protein C, Protein S and Anti-thrombin III are the major natural circulating inhibitors of coagulation. Inherited deficiency of these factors (thrombophilia) is recognised to be associated with venous thromboembolism, but has not commonly been associated with arterial thrombosis. Over the last 18 months patients with suspected cerebrovascular disease for thrombophilia were routinely screened. Protein C deficiency was found in eight patients, Protein S deficiency in 10 patients and anti-thrombin III deficiency in one patient. None had evidence of acquired deficiency or anticardiolipin antibodies and these deficiencies were confirmed on repeat sampling, suggesting an inherited aetiology. Transient thrombophilia was detected in a larger number of patients. The patients with inherited thrombophilia were younger than average, but there were no other distinctive clinical features. Other risk factors for thrombosis, particularly smoking, were frequently present. Eighteen patients presented with arterial cerebral ischaemia, including transient ischaemic attacks, minor and major

strokes. One patient presented with the syndrome of benign intracranial hypertension from cerebral venous thrombosis. Family studies revealed affected first degree relatives in several families. It is concluded that thrombophilia is an important risk factor for arterial, as well as venous, cerebrovascular disease. Management in most cases includes long-term anticoagulation, but it is important to note that heparinisation is required before instituting warfarin therapy.

COMPARISON OF ELECTROMAGNETIC STIMULATION OF THE BRAIN AND CT SCANS IN PREDICTING FUNCTIONAL OUTCOME AFTER STROKE

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In a longitudinal study central motor conduction time (CMCT) was measured to muscles of the upper limb in 118 first-ever stroke patients, to determine the value of electromagnetic brain stimulation in predicting functional outcome at 12 months. Estimates of CMCT, obtained within 12–72 hours of symptoms, were shown to be predictive of outcome. Observations on CT scans performed on 107 of the same patients are compared in this paper with the CMCT values, mortality and functional assessments at 12 months, including motricity index for muscle strength, nine hole peg test for manual dexterity, Barthel score for activities of daily living and the modified Rankin scale for functional outcome.

The absence of recordable responses following electromagnetic brain stimulation correlated with poor outcome at 12 months and increased mortality. Patients with cerebral infarction were the most likely to demonstrate abnormal CMCT and showed the least functional recovery. CT scans were less reliable than measures of CMCT in predicting outcome.

Clinical assessments, CMCT and CT scans all have some predictive value. The main advantage of CMCT is that the measurements can be performed at the bedside within hours after stroke to provide prognostic information regarding mortality and recovery.

HIV INFECTION: PATHOLOGICAL FINDINGS CORRELATED WITH MRI

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MRI forms an important part of the assessment of patients with HIV-related disease presenting with cerebral symptoms. Theoretical considerations, however, raise the possibility that MRI may be relatively insensitive in detecting pathological changes in HIV infection because of the subdued inflammatory response in immunosuppressed patients.

Eleven formalin-fixed brains were studied at 0.5T using both T2-weighted (coronal SE4000/80, transverse SE2600/80) and T1-weighted (IR4000/150/40) sequences with 5 mm slice thickness. The brains were subsequently sliced in coronal plane before photography and histological sectioning.

In two cases of progressive multifocal leucoencephalopathy and one case of toxo-

plasmosis and lymphoma, the extent of white matter abnormality seen at MRI corresponded broadly with that found at pathological examination.

In general, however, histological changes were detected more frequently than lesions seen by MRI. The following were not apparent at MRI: multiple tuberculous granulomata; extensive multinucleated giant cells and microglial nodules; perivascular mononuclear cell cuffing and CMV inclusions.

A commonly observed MRI finding was punctate or patchy high signal in the basal ganglia on T2-weighted images (6 cases). Corresponding histological changes included calcification of vessel walls with widened perivascular spaces (2 cases) and mineralised neurons (2 cases).

SEMANTIC DEMENTIA: FLUENT APHASIA WITH TEMPORAL LOBE ATROPHY

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Five patients are reported with a stereotyped clinical syndrome characterised by fluent dysphasia with severe anomia, reduced vocabulary and prominent impairment of single-word comprehension, progressing to a stage of virtually complete dissolution of the semantic components of language. A marked reduction in the ability to generate exemplars from restricted semantic categories (for example, animals, vehicles) was a consistent feature. Tests of semantic memory demonstrated a radically impoverished knowledge about a range of living and man made items. In contrast, phonology and grammar of spoken language were largely preserved, as was syntactic comprehension. Reading showed a pattern of surface dyslexia. Autobiographical and episodic memory were relatively retained. Non-verbal memory, perceptual and visuospatial abilities were also strikingly preserved. Radiological investigations have shown marked focal temporal atrophy in all five patients, and functional imaging by SPECT and PET (one case) have implicated the dominant temporal lobe in all five. Such cases would previously have been subsumed under the rubric of Pick's disease. This syndrome is distinct from non-fluent primary progressive aphasia which affects mainly phonology and syntax, spares semantic memory and hence more fundamental aspects of cognition and involves different anatomical regions.

A CONTROLLED, LONGITUDINAL STUDY OF DEMENTIA IN PARKINSON'S DISEASE

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Serial assessments of cognition, mood and disability were carried out at nine monthly intervals over a 54 month period on a cohort of 87 Parkinson's disease (PD) patients and a cohort of 50 control subjects matched for age and sex. Dementia was diagnosed from data using DSM 111-R criteria, rigorously applied. Initially, 6% (5/87) PD patients were demented, compared with none of the 50 control subjects. A further 10 PD patients met the dementia criteria during the follow

up period; employing survival analysis, this is equivalent to a cumulative incidence of 19%. Using the number of person-years of observation as the denominator, the incidence rate is 47.6 per 1000 person-years of observation. None of the control subjects fulfilled dementia criteria during the follow up period. Compared with PD patients who did not become demented, those who became demented during follow up were older at onset of Parkinson's disease, had a longer duration of Parkinson's disease and were older at inclusion to the study.

PARKINSON'S DISEASE IN TWINS STUDIED WITH ^{18}F -DOPA AND POSITRON EMISSION TOMOGRAPHY
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The role of genetic factors in Parkinson's disease (PD) is uncertain. ^{18}F -dopa and PET was used to examine concordance for disruption of the nigrostriatal dopaminergic system in co-twins of patients with PD.

Of 11 monozygotic (MZ) twin pairs, one pair was clinically concordant, and both twins were scanned. Of the remaining MZ pairs, 10 asymptomatic co-twins and eight affected twins were studied. Of seven dizygotic (DZ) pairs, seven asymptomatic co-twins, and five affected twins were studied.

Mean ^{18}F -dopa uptake was significantly reduced in putamen and caudate (38% and 66% of normal, respectively) of twins with PD. Mean putamen ^{18}F -dopa uptake for the MZ and DZ asymptomatic co-twin groups, was also significantly reduced (87% and 83% of normal, respectively). Four of the 10 MZ and two of seven DZ asymptomatic co-twins had putamen ^{18}F -dopa uptake reduced more than two standard deviations below the normal mean. Three of these four asymptomatic MZ co-twins had a tremor on neurological examination.

Our concordances of 45% and 29% in the MZ and DZ pairs, respectively, suggest that the concordance for nigral pathology in PD twins is higher than previously realised. The findings also indicate the presence of an isolated postural or rest tremor may be a phenotypic variant of PD.

PRESERVED MOTOR LEARNING IN PARKINSON'S DISEASE
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The motor disorder of Parkinson's disease (PD) includes deficits in complex movements such as sequencing and dual task performance. The basal ganglia have been implicated in the learning of motor skills but few studies have examined the ability of patients with PD to improve their motor performance with repeated trials. We used an isometric task to assess motor learning in PD and controlled for individual differences in strength, fatigue and incoordination. Subjects were required to achieve a target force level without visual feedback; learning was assessed from the improvement in the deviation from the target that occurred with repeated trials. Patients with PD consistently underreached the target force level but the

rate of improvement in performance across repeated trials was normal. Rate of learning correlated with some cognitive measures but not with clinical motor disability or severity of depression. Treatment had no effect upon learning despite clinical benefit. These results indicate dissociation between the ability to achieve an intended force level of isometric force and motor learning in PD. These aspects of motor learning appear to be relatively independent of dopamine pathways of the basal ganglia; they are related to cognitive processes and may depend upon cortical function.

MRI IN THE THORACIC OUTLET SYNDROMES
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Thoracic outlet syndromes (TOS) due to cervical ribs or bands may present with brachial plexus or subclavian artery compression. They are difficult to diagnose because the clinical and electrophysiological manifestations are variable and often mild. New and more accurate diagnostic techniques are necessary.

The role of MRI was studied in 20 patients with suspected TOS. MRI of the supraclavicular fossa was evaluated "blind" for distortion of the brachial plexus, and for the presence of an anatomical structure corresponding in position to a cervical rib or band. The observed brachial plexus distortion corresponded to the symptomatic side in 18/20. Three groups of abnormalities were noted:

- 1) Distortion of brachial plexus (15/20) [non-calcified rib/band (11/20), calcified rib (4/20)]
- 2) Distortion of brachial plexus plus subclavian artery (3/20) [non-calcified rib/band (2/20), calcified rib (1/20)]
- 3) Other (2/20) [tortuous subclavian artery without brachial plexus distortion (1/20), normal 1/20].

These findings suggest that MRI may be valuable in diagnosing TOS, firstly, by demonstrating brachial plexus distortion or vascular compression, and secondly by visualising radiographically invisible ribs or bands.

LUMBOSACRAL MOTOR ROOT LESION: A STUDY WITH MAGNETIC STIMULATION
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A method to identify lumbosacral motor root lesion is introduced. Conduction time to abductor hallucis (AH) muscle (root supply L5, S1) with lumbosacral magnetic stimulation was measured. Subtracting this value from total peripheral motor conduction time to AH yielded the L5 or S1 "Motor Root Conduction Time (MRCT)."

Twenty five normal controls, 30 with lumbosacral spondylosis and six with unilateral peroneal nerve palsy were studied. The inter-side MRCT differences (left minus right) in controls were -0.82 to $+0.96$ (95% confidence limits). The patients with lumbosacral spondylosis were grouped on clinical and radiological basis into: 1) no L5 or S1 root compression; 2) root compression without motor deficit; 3) root compression with motor deficit.

Significantly abnormal interside MRCT differences were noted in all the patients of Group-3 and in 45% of Group-2, but the remainder of the patients showed normal results. This simple, quick and non-invasive method helps to diagnose L5 or S1 motor radiculopathy and to distinguish a root lesion from a peroneal nerve palsy.

FAVOURABLE OUTCOME IN ANTERIOR INTEROSSEOUS NERVE LESIONS
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Anterior interosseous nerve (AIN) lesions are often thought to require surgical decompression. The authors present their experience with six patients (age range 23-45 years) seen consecutively in our department, whose AIN palsies were managed conservatively. Potentially relevant preceding events included childbirth in one and physical exertion in three. One patient had coeliac disease and another had ankylosing spondylitis. All patients presented with the characteristic weakness of pinch between thumb and index. The onset was acute with upper arm pain in five patients, which peaked within four weeks and thereafter declined. Numbness or weakness outside the territory of the AIN was detected in three. Electromyography revealed signs of denervation in flexor pollicis longus, flexor digitorum profundus and/or pronator quadratus. Three patients had had an episode of brachial plexus neuropathy five to 20 years earlier (same arm in 1), with complete or almost complete resolution.

In all but one patient there was little or no improvement at six months, but all had begun to improve by eight months and recovery was virtually complete by 11-20 months. It is concluded that AIN lesions may occur as a circumscribed form of brachial plexus neuropathy (neuralgic amyotrophy) and that, if presentation is acute, surgery should be deferred.

FOLATE HOMOCYSTEINE, MONOAMINE AND BIOTIN METABOLISM IN DEPRESSION
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Low serum or red cell folate occurs in 20-30% of patients with severe depression. Folate replacement in such patients enhances response to antidepressant therapy. Recent studies have shown that plasma homocysteine levels are a good guide to functional folate deficiency. Folate deficiency has been shown to influence serotonergic activity in humans and experimental animals. The mechanism of this effect is unknown but one possibility is through an influence on tetrahydrobiopterin (BH4) metabolism. We have therefore studied folate metabolism (red cell and CSF folate), total plasma homocysteine and CSF monoamine metabolites (5HIAA and HVA) in 34 patients with severe depression according to DSM III criteria. Ten of these patients also had CSF BH4 measurements.

Low red cell folate values below 150 ng/ml, indicating folate deficiency, were present in 20.3% of patients. Total plasma homocysteine was significantly elevated in this folate deficient group and was negatively correlated with red cell folate levels in the total depres-

sed population. CSF 5HIAA, HVA and BH4 were all highly correlated with each other and were each positively correlated with red cell folate. CSF 5HIAA was significantly lower in the folate deficient subgroup. These findings confirm that low red cell folate levels in depression are associated with a functional folate deficiency and provide further evidence of the links between folate, monoamine and bipterin metabolism.

COMBINED CLINICAL AND LABORATORY AUDIT OF IMMUNOCHEMICAL ASSAYS IN SUSPECTED MULTIPLE SCLEROSIS

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The optimal combination of immunochemical tests to support a diagnosis of multiple sclerosis (MS) has not been defined. Paired serum and CSF samples from 219 new patients with suspected MS were analysed over a two year period. Thirty nine patients had clinically definite MS and 101 had probable MS. IgG Ratio and IgG Index were estimated using the Laurel Rocket technique. Polyacrylamide gel and isoelectric focusing electrophoresis (IEF) were used to estimate the presence of oligoclonal bands. Immunoblots were performed to detect Free Light Chains. Factors audited in each assay were diagnostic accuracy, appropriateness, cost-effectiveness and laboratory characteristics. The combination of elevated IgG index and the detection of oligoclonal bands by IEF gave the best discrimination between MS and other neurological diseases (OND). Ninety seven per cent of clinically definite MS and 12% of OND were abnormal. These two assays give the same diagnostic yield as all five assays combined and allow a result to be obtained within two days at fifty per cent of the cost. Freed light chains were only observed in CSF of MS patients who had oligoclonal bands.

CORTICOSTEROIDS AND THE PREVENTION OF ADVERSE REACTIONS TO MYELOGRAPHY

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Side effects of iohexol myelography were compared after pre-treatment with corticosteroid (oral dexamethasone, 4 mg 4 times daily for 24 hours pre- and post-myelogram, $n = 42$) or placebo ($n = 44$) in a prospective, randomised, double blind, controlled clinical trial. Although myelogram side effects were more common in the placebo group, the differences generally did not reach statistical significance. The authors cannot recommend the routine prophylactic use of oral corticosteroids for myelogram side effects and their results may cast doubt on their use in the treatment of these symptoms once they have developed. These findings also suggest that inflammatory processes (allergic or chemical irritant), relating to the contrast agent itself, against which corticosteroids might have been expected to act, have at most a minor pathogenetic role in post-myelogram symptomatology.

STROKE SPECT AND THE ISCHAEMIC PENUMBRA

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The importance of the ischaemic penumbra following stroke is that tissue within it might be recoverable. Recent work has been equivocal on its importance. A region of transitional blood flow must exist; the question is of its frequency, volume and natural history. High resolution SPECT using ^{99m}Tc HMPAO would detect such regions. 50 consecutive first strokes had serial SPECT at one, seven and 90 days using a NOVO 810 dedicated multidetector tomographic head scanner along with clinical examination, CT and appropriate investigations.

In 15 cases the infarct reperused. No penumbra could be seen. Some techniques, studying cases only once, would have identified reperfusion as penumbra.

Eight cases exhibited partial maintenance of perfusion within cortex overlying an infarct. These areas could be considered to be penumbral, but derive their maintained blood supply from superficial vessels and do not surround the infarct. Activity decreased during sequential studies. This could be due to diaschisis, excitotoxins, transneuronal and transsynaptic cell death rather than ischaemia.

In 27 cases, the infarct border was sharply demarcated. No transition zone greater than that attributable to the scanners resolution was seen.

In this series of unselected consecutive cases, no evidence for an important role for an ischaemic penumbra was identified. This has implications for treatment options in stroke.

RECURRENT ENCEPHALOPATHY IN HYPOPITUITARISM

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Three women in late middle life each had three discrete episodes of confusion. These recurrent confusional attacks could not be explained solely on the basis of an associated infection. All three patients had latent and unsuspected hypopituitarism confirmed on final presentation by endocrine function tests. (Each patient had had a severe post-partum haemorrhage followed by two further pregnancies) The diagnosis was recurrent confusional episodes due to hypopituitary encephalopathy. Experienced clinicians had not made the diagnosis as the history was not immediately available in the confused patient, and the significance of deficient axillary and pubic hair was not given due emphasis. The three cases spontaneously recovered from two episodes of unrecognised hypopituitary encephalopathy without specific hormone replacement. Two cases were purely cortisol deficient (they had previously been diagnosed as myxoedematous and were being treated with thyroxine). Previous post-partum haemorrhage may have caused partial pituitary necrosis, followed by an additional age related depression in pituitary function leading to hypopituitarism. Where encephalopathy occurs which is not adequately explained by an infective illness, a metabolic encephalopathy and signs and symptoms of hypopituitarism should be sought.

ISO-ELECTRIC FOCUSING OF IgG IN AQUEOUS HUMOUR IN MULTIPLE SCLEROSIS

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This study was prompted by three observations a) aqueous humour is in many ways similar to CSF except for a lower protein content, b) about 18% of patients with multiple sclerosis show asymptomatic ocular inflammatory change, c) aqueous fluid is close to the optic nerve which is often attacked in multiple sclerosis.

For control data aqueous humour was obtained at routine cataract surgery (35 patients). Two patients with multiple sclerosis (MS) scheduled for cataract extraction consented to aqueous sampling. Four patients with MS and acuity in the sampled eye $> 6/60$ agreed to an elective aqueous tap, which was performed without complication. One of these four had MS-uveitis syndrome. Informed consent was obtained at all times.

In several cataract control patients tau protein was detected. A monoclonal paraprotein was noted in one control. Only the MS-uveitis patient had oligoclonal bands, the remaining five were negative. One patient with oligoclonal bands in CSF did not show bands in aqueous humour.

Despite the proximity of aqueous fluid to a diseased optic nerve, oligoclonal bands are unlikely to be found routinely in MS. Where there is active uveal disease, such bands may be expected.

CHANGES ON OCCUPATIONAL MORTALITY IN MOTOR NEURON DISEASE

CH Hawkes, AJ Fox. Ipswich Hospital, Office of Population Censuses and Surveys, London

In 1981 an excess number of deaths was reported from MND in leather workers based on occupational mortality tables from the Office of Population Censuses and Surveys (OPCS). This observation was subsequently confirmed and formed the basis of our "solvent" hypothesis. Because there was no preponderance of MND deaths in tanners, we suggested that exposure to solvents during the course of boot and shoe manufacture might be causally related. Since 1960, the type of glue and solvent used in leather work has changed and this might have an effect on occupational mortality, especially if MND has a long "incubation" period.

The male occupational mortality figures for MND from 1979-80 and 1982-89 (ages 16-74) were obtained. From this, occupations were listed in rank order according to individual proportional mortality ratio (PMR).

It was noted that leather workers are not now among the occupations with the highest PMR. High PMRs are found in industrial designers (422), typists/secretaries (285), electrical engineers and radio/TV mechanics (273 and 261 respectively).

Clearly the pattern of occupational mortality has altered. Conceivably this represents change in environmental exposure, or may imply that employment is not causally related to the disease.

IS PARKINSON'S DISEASE A PRIMARY OLFACTORY DISORDER?

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It has been recognised for at least 10 years that olfaction function as measured by subjective techniques, is impaired in Parkinson's disease (PD). Olfactory function in PD was examined by 1) olfactory evoked response (OEP) to a 200 mS pulse of hydrogen sulphide in 37 patients. This provokes a specific olfactory response with no trigeminal activation; 2) University of Pennsylvania Smell Identification Test (UPSIT)—this utilises 40 test odours with forced choice from a list of four possible answers. All subjects were vetted by questionnaire for coexisting nasal or systemic disease.

Fifteen of 37 patients had no OEP to H₂S. In the others, there was significant delay to N₁ and P₂ ($P < 0.002$, 2 sample *t* test) with no significant reduction of amplitude, compared with matched controls. On UPSIT, there was a highly significant difference of score at all ages ($p < 0.0001$, Logit transformation of percentage score). Three of four patients with normal UPSIT had an abnormal OEP.

Olfaction in PD is not simply impaired, it is devastated. Over 90% of patients with PD have olfactory dysfunction, a sign which is therefore more common than tremor and probably of equal frequency to rigidity or akinesia. Because of the predominance of smell impairment, it is suggested that PD could be viewed as primary hyposmia with associated movement disorder.

CASE-CONTROL STUDY OF GLIOMA IN EAST ANGLIA

CH Hawkes, P Butcher. Ipswich Hospital, Ipswich

In view of the high nitrate levels in East Anglian drinking water and a slight excess of proportional mortality rate for glioma in this area, a case control study was initiated from 1983–86, with particular emphasis on nitrate/nitrite exposure.

A total of 104 histologically proven glioma patients without language or mental impairment were interviewed from the Ipswich, Norwich and Norfolk, Addenbrookes and Oldchurch Hospitals. Samples of home tap water were analysed for nitrate/nitrite content. Each patient was matched with a control ($N = 104$) according to age, sex and region using the electoral roll. Data were examined by McNemar's test of proportions for yes/no outcomes and a 1-sample paired *t*-test for quantitative outcomes. No correlation was found for the majority of food and drink related questions. Some significant values were obtained in a direction opposite to that expected, for example, x-ray exposure and wine consumption were more frequent in controls.

The data suggest there is no link between nitrite/nitrate exposure and the development of glioma. Despite earlier claims, it is also unlikely that exposure to x-rays is a risk factor.

COHORT ANALYSIS IN MOTOR NEURON DISEASE

CH Hawkes, AJ Fox. Ipswich Hospital, Ipswich and Office of Population Censuses and Surveys, London

Over the past 30 years motor neuron disease

(MND) mortality rates have increased, especially in the aged. It may be a spurious effect of fashion or increasing numbers of neurologists and/or geriatricians. To clarify this, we examined birth cohorts from 1875 onwards for MND and compared them with other neurological disease such as, Alzheimer's disease (AD), Parkinson's disease (PD), multiple sclerosis (MS) and poliomyelitis. Mortality figures for 1940–89 were used. As a "fashion" indicator we counted the number of articles written on these conditions since 1940 in two major journals. Allowance was made for "Rule 3" changes introduced in 1983, in which additional death certificate information was used to classify cause of death.

The cohort analysis for MND shows a continuing upward trend in the elderly which commenced around 1960, some 15 years before the "fashion" indicator showed an upturn, although the number of UK neurologists and geriatricians began to increase at about the same time. Over a similar period, PD cohorts have decreased. AD cohorts after 1980 are likely to be affected by Rule 3 changes and fashion, but older cohorts (60+) showed an increase before 1980. MS in general shows a diminishing cohort mortality rate.

It is still not possible to resolve with certainty whether there is a real increase in MND in the older age ranges. Most likely there is, but less dramatic than it appears.

NATIONAL MOTOR NEURON DISEASE TWIN STUDY: INITIAL RESULTS

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This ongoing study uses a new approach devised by one of the authors (CHH), which may be termed the "Death Discordant Twin Pair" method. Initially, all deaths from motor neuron disease (MND) were extracted from the Office of Population Censuses and Surveys over the period 1979–89. From this database of nearly 11 000 individuals, England and Wales birth indexes from 1900 onwards were searched for possible twins. For each twin identified (131 pairs), the NHS Central Registry was asked to locate the relevant Family Practitioner Committee and thence the co-twin's general practitioner. Provided consent was given, the co-twin was interviewed so that zygosity and putative causes could be ascertained by questionnaire.

This searching process produced the following:— a) 53 living co-twins; b) five embarked; c) 60 dying as adults or infants; d) three not MND; e) 10 untraceable. Valid data have been obtained on 70 twin pairs. This figure includes 17 pairs where both twins were deceased. Using validated zygosity related questions with co-twins and/or relatives, we have identified a) 48 dizygous pairs, all discordant for MND; b) 22 monozygous pairs of whom two were concordant and one of these gave a family history of MND.

At face value these results suggest a mainly environmental cause for MND but preliminary analysis suggests considerable heterogeneity.

USING "SMART HANDLES" TO MAKE A RAPID NEUROLOGICAL DIAGNOSIS

CH Hawkes. Ipswich Hospital, Ipswich

Physicians are particularly skilled at making a

diagnosis, often by process of pattern recognition, but most are unaware of their methods. Simple yes/no algorithms are slow and rarely implemented, apart from teaching. A "smart handle" is a term I have coined to describe a symptom or sign that either localises the lesion or suggests one or, at most, a few possible diagnoses. They approximate to the "demon" used by knowledge engineers in Expert System construction.

The following are examples of "smart handles":— Lhermitte's sign; reversed Lhermitte's sign; neck weakness; jaw supporting sign; isolated finger drooping; delayed shoulder shrugging in hemiplegia; bitemporal hemianopia; preserved pupillary response in III nerve lesion; downbeat nystagmus; internuclear ophthalmoplegia; inverted supinator jerk.

Rather than plodding through a routine history and examination, it is suggested that "smart handles" should be sought out actively. They represent a different way of thinking, analogous to "lateral" thought and provide the basis of clinical experience.

EXPERT SYSTEM DESIGN USING LEVEL 5 OBJECT: AN EXAMPLE BASED ON MOTOR NEURON DISEASE

CH Hawkes. Ipswich Hospital, Ipswich

An Expert System is a computer program designed to give the inexperienced guidance in an area of complex knowledge. Such a program differs from simple algorithms in that the user may ask "why?" at any decision point and complex logic statements may be handled. Conventional expert systems require considerable skills in a high level language, such as Pascal or 'C'. Level 5 Object is a device which allows someone with little knowledge of programming to generate a knowledge base, sophisticated displays and hypertext all within a short period of time.

As an example, an expert system has been constructed (using Level 5 Object) to help a doctor decide if a patient has motor neuron disease, whether it is sporadic or familial and which of five categories it belongs, that is, proven, definite, probable, possible or suspected. The system uses the latest criteria defined at El Escorial (1989) and Baarn (1991). A backward chaining procedure is used with 1 complex rule and explanatory points in hypertext.

It is concluded that Level 5 Object would be of value a) for rapid construction of expert systems in other areas of Neurology (for example, diagnostic aids); b) construction of computer based teaching methods.

F-TACHEODISPERSION AND F-CHRONODISPERSION. I: CONTROL SUBJECTS

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F-chronodispersion of a nerve was described by one of the authors (CPP) to denote the scatter or dispersion of the relative latencies of statistically significant numbers of consecutively recorded F-waves. Similarly, F-tacheodispersion of a nerve is defined as the distribution of the conduction velocities of individual or small groups of nerve fibres estimated from significant numbers of consecutively recorded F-waves.

We have studied these methods with use of

computerised programs (which makes their application easy in clinical neurophysiological practice) in statistically significant numbers of control subjects. Their parameters (range, distribution, mean \pm SD) were estimated from more than 50 consecutive F-waves for the ulnar and peroneal nerves bilaterally. F-tacheodispersion was estimated with the formula: $Distance/[(F_{shortest} - M_{latency} - 1)/2 \times ((F_{shortest} - 1)/(F_x - 1))]$. The reliability of this formula was verified with application in identical orthodromic and antidromic responses.

The mean range of F-tacheodispersion was 7.8 ± 1.6 ($60.0 \pm 3.6 - 67.8 \pm 4.4$) m/s for the ulnar and 7.5 ± 1.5 ($52.4 \pm 2.5 - 59.9 \pm 3.2$) m/s for the peroneal nerve. The mean range of F-chronodispersion 3.3 ± 0.6 (26.5 ± 2.7) ms for the ulnar and 5.3 ± 1.0 ($38.3 \pm 3.7 - 43.5 \pm 4.1$) ms for the peroneal nerve. The limited range of both is attributed to anatomical and physiological properties of individual or small groups of the motor fibres of a nerve. No statistical significant differences were found between right and left.

F-TACHEODISPERSION: A NEW NEUROPHYSIOLOGICAL METHOD. II: PATIENTS WITH NEUROPATHIES AND RADICULOPATHIES
E Chroni, CP Panayiotopoulos. St Thomas' Hospital, London

The authors studied F-tacheodispersion and F-chronodispersion (see previous abstract) in patients with polyneuropathies, mononeuropathies and radiculopathies and compare them with statistically significant numbers of controls. All subjects had additional conventional M-response (CMAP amplitude, area, duration and MNCV) and F-wave (F-shortest/height) studies.

The most significant finding was that F-tacheodispersion and F-chronodispersion were abnormal even when conventional M-response parameters and shortest F-wave latencies were normal. F-chronodispersion may be normal in severe neuropathies because of clustering of slow conducting fibres which, however, are quantitatively appreciated by F-tacheodispersion.

Furthermore, these methods were tested in patients with polyneuropathies who had abnormal conventional studies in some but not all of their nerves. Application of F-tacheodispersion in these "normal" nerves showed significant abnormalities which conventional methods had failed to detect. In some nerves F-tacheodispersion showed that more than 50% of motor fibres were abnormally slow despite normal conventional neurophysiological values.

The reliability and sensitivity of F-tacheodispersion was also demonstrated in a patient with Guillain-Barré syndrome with serial, from onset to recovery, measurements.

It is not longer concluded that a nerve is neurophysiologically "normal" unless F-chronodispersion and particularly F-tacheodispersion have been properly applied and found to be normal.

"NAMED PATIENT" EXPERIENCE WITH LAMOTRIGINE IN CARDIFF: A REVIEW
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Our "named-patient" experience with lamotrigine as add-on treatment for management

of "treatment resistant" epilepsy is reviewed.

Eighty two patients started lamotrigine. Duration of usage equated to "55 patient years". In 22 patients lamotrigine was withdrawn. Primary reasons for withdrawal were: lack of efficacy (13 patients), rash (6 patients), eczema (1 patient), aggression (1 patient), death (1 patient). Other adverse effects reported were hot itchy skin (2 patients), exacerbation of psoriasis (1 patient), diplopia (2 patients), drowsiness (1 patient), headache (1 patient), exacerbation of psychiatric problems (1 patient).

For the 60 patients continuing with lamotrigine, age at starting lamotrigine (mean 30 years; range 14 to 58), and changes in seizure frequency (% reduction from baseline) (mean 51% reduction; range -60 to 100) were noted. Changes in seizure type were also evaluated. A modest increase in the number of patients experiencing simple partial seizures, and a decrease in the number of patients experiencing complex partial, secondary generalised tonic clonic, primary generalised tonic clonic, absence, myoclonic, tonic and clonic seizures was recorded. The mean number of anticonvulsant drugs per patient increased from 2.1 to 2.7 after the addition of lamotrigine indicating that in some patients other anticonvulsants had been withdrawn.

MORTALITY FROM PARKINSON'S DISEASE IN ENGLAND AND WALES 1921-89
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Age-standardised mortality from Parkinson's disease in England and Wales was re-examined using published government statistics.

The increase in mortality 1921-89 can be attributed to improved death certification. The dramatic fall in 1940 and rise in 1984 were artefacts caused by changes in certification. In the intervening period classification remained stable as did mortality in males. In females, the fall in mortality 1960-80 began before the introduction of levodopa. Mortality increased in the early 1980s in both sexes.

Age-specific mortality fell from 1940 in all groups below 75 years and in both sexes. The fall may have been accelerated by levodopa. The rise in groups above 75 was attenuated by levodopa but increased in the early 1980s. Analysis by birth cohort showed a progressive decline in mortality at younger ages with successive cohorts but stable mortality in the elderly.

The reduction in mortality in younger patients began before levodopa was introduced and cannot be entirely attributed to improved general medical care. It remains more likely that younger patients were misclassified cases of "late-onset" Parkinsonism following encephalitis lethargica which can be differentiated from older cases of idiopathic Parkinson's disease.

CONVERSATIONAL DYNAMICS IN PARKINSON'S DISEASE
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Parkinson's disease (PD) causes communicative problems which have often been attributed to speech impairments such as dysarthria and dysphonia. The potential role of social factors were investigated. Six

patients with PD and six spouses of patients were assigned to groups of four, to engage in semi-structured conversations which were video recorded for 10 minutes; no outside observers were present. The number and duration of utterances, and other behaviours of each individual were measured in two situations: a) in a group comprising either four patients or four spouses; and b) in a group including two patients and two unaffected people (who were not the spouses of the patients). In unmixed groups the patients had a conversational pattern similar to that of the spouses, although with significantly less gestural body movements. In the mixed groups, the patients contributed a significantly reduced proportion of the conversation than did the spouses. This suggests that communicative behaviour is altered by the presence of people with PD for reasons other than neurological impairment. The finding accords with the observation, which may not be specific to PD, that spouse-carers tend to "talk over" patients. A therapy programme was devised for the patients but did not significantly improve communicative competence.

PSYCHOSOCIAL EFFECTS OF SPASMODIC TORTICOLLIS
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Spasmodic torticollis is one of the most common focal dystonias. Aetiology is unknown, but functional disturbances within the basal ganglia has been suggested.

Forty four patients had standardised neurological, psychiatric and psychological examinations. Objective disability and psychosocial handicaps were evaluated with a specially designed questionnaire. Individual coping strategies were rated with an established questionnaire for chronic diseases. Parameters of psychopathology were measured with the symptom-check-list-90.

Remarkable impairments were found for all the tested fields (profession, social life, family and emotional state). Twelve patients retired from work. Six patients were off work for more than one year. Eighty per cent of the patients frequently avoid public activities, 55% of them completely. The psychopathological test (SCL-90) also revealed less self-confidence in social contacts as obsessive-compulsive behaviour and minor depression. The psychopathological indices lay between normal subjects and psychiatric outpatients. In our group patients with laterocollis were more affected than patients with rotational torticollis.

POSITRON EMISSION TOMOGRAPHY (PET) DEMONSTRATES CEREBELLAR HYPOMETABOLISM IN A CASE OF INHERITED PRION DISEASE
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Positron emission tomography. (PET) demonstrates bi-parietal bi-temporal hypometabolism in individuals with dementia of the Alzheimer type.

We present a 49 year old man who presen-

ted with a six year history of cognitive impairment and a family history of presenile dementia. Neurological examination revealed evidence of cognitive impairment, a rest tremor and cogwheel rigidity, but no cerebellar signs.

He had PET (Steady State Oxygen method) as a patient with presumed probable Alzheimer disease. This demonstrated left cerebellar hypo-metabolism, in addition to a bi-parietal deficit. No other case ($n = 8$) in this cohort with probable Alzheimer disease showed cerebellar hypo-metabolism (left cerebellar MRO2 2.85 ml/min/dl (normal 3.78 ml/min/dl \pm 0.37. $n = 12$) outside 95% confidence interval $p = 0.05$). Subsequent prion protein gene analysis revealed the 144 base pair insert.

It is believed that this is the first time cerebellar hypometabolism has been demonstrated in inherited prion disease. Retrospectively we can conclude that the cerebellar hypometabolism differentiates this case from

the others in our cohort with probable Alzheimer's disease. This further supports the notion that functional neuroimaging is useful in the differential diagnosis of dementia.

RECOVERY OF ARM FUNCTION FOLLOWING A STROKE: A RANDOMISED CONTROLLED TRIAL

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Previous studies have shown that only 15% of patients who have a totally paralysed arm when first seen after a stroke will regain full control of the limb.

This study involved a prospective, stratified, randomised trial with single blind assessments. One hundred and thirty two consecutive stroke patients, seen initially within 21

days, were involved. The "treatment group" received more intensive therapy. In addition, every attempt was made to encourage the patient and family to be active participants in arm rehabilitation. Specific attempts were made to prevent "learned non-use" of the affected arm and to facilitate learning of new motor skills. The "control group" received conventional therapy based on standardised techniques provided in rehabilitation departments.

Assessments were carried out as soon as the patient was referred and at one, three, and six months post-stroke by an external assessor who was not involved in day-to-day running of the project.

The "treatment group" showed a statistically significantly better recovery of range and strength of movement and speed on a manual dexterity task. The effects were most marked in patients with milder initial disabilities. There were no effects on measures of recovery other than arm function.